

A composite image featuring a photograph of an American Pacific Airlines Boeing 747-200 in flight, banking to the right. The aircraft is white with a blue stripe and the airline's name in blue lettering. Below the aircraft, a dense urban landscape is visible. Overlaid on the left side of the image is a white wireframe model of the same aircraft, showing its internal structure. The background is a dark, cloudy sky.

ATC HANDBOOK

Understanding Air Traffic Control and Radio Communications

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HOW TO USE THIS HANDBOOK

One of the most exciting new features of Flight Simulator 2002 is interactive air traffic control (ATC). You'll now have plenty of company in the busy skies of Flight Simulator. You can ask for and receive clearances, be warned of air traffic near you, get vectors, and hear controllers speaking to other aircraft. This handbook is for all users: people who are new to Flight Simulator and ATC, experienced simulation enthusiasts, and real-world pilots.

You **do not** have to interact with the ATC system in order to fly in Flight Simulator 2002. ATC is an enhancement to the Flight Simulator world, but you can still fly from one place to another without communicating with anyone until you're ready to use the ATC system. When you do start using ATC in Flight Simulator 2002, take advantage of the Autotune feature, which can tune the radio for you and lessen your workload. (See **Using the Autotune Feature** on page 46.)

Note

It's beyond the scope of this document to provide an extensive education in all the complexities of the real-world air traffic control system. The purpose is to give you enough information to use the ATC system in Flight Simulator 2002. Along the way, we'll include references to more information about ATC and radio communications. A fantastic Web site for learning more about the world of air traffic controllers is Air Traffic Café (see the "**Sites to Visit**" section of the Flight Simulator 2002 Web site). Our partner, the Aircraft Owners and Pilots Association (AOPA), also has a wealth of information about all aspects of flying. For more information, see the link to AOPA on the Flight Simulator 2002 Web site.

There are advanced topics for instrument-rated pilots in this Handbook. However, this isn't some secret information that you're barred from if you're a novice. Once you get more experience and learn the system, you can make use of the advanced topics, too. If there is terminology that you don't understand anywhere in this Handbook, see the **ATC Glossary** on page 60.

HOW TO USE THIS HANDBOOK

Novices

If you're new to Flight Simulator, you'll have more fun if you first learn to fly using the Lessons. Once you feel comfortable at the controls of one or more of the Flight Simulator 2002 aircraft, take the time to read through this Handbook and learn how to use ATC and radio communications. You'll need to understand how the system works as well as understanding the language of ATC. That's all here in this Handbook. The Autotune feature will tune new radio frequencies automatically (see **Using the Autotune feature** on page 46).

Intermediate

If you're an experienced Flight Simulator user but are unfamiliar with air traffic control, take time to read through the sections below. You'll learn how the ATC system works and how to operate within that system in Flight Simulator 2002. The Autotune feature will tune new radio frequencies automatically (see **Using the Autotune feature** on page 46).

Advanced

If you're a pilot or experienced simulator user, you may want to jump to the sections **Using ATC in Flight Simulator 2002** on page 44 and **Real-World Differences** on page 52. The Autotune feature will tune new radio frequencies automatically (see **Using the Autotune feature** on page 46).

Getting started in ATC

Remember to use the numbers along the top of the keyboard when making choices from the ATC menu. The numbers on the numeric keypad (usually on the right side of the keyboard) are assigned to other functions in Flight Simulator 2002.

To learn more about using the ATC menu, (see **Using the ATC menu** on page 49).

WHAT IS AIR TRAFFIC CONTROL?

Introduction

Just as on a busy highway, the tremendous volume of aircraft flying the skies today requires traffic management. Someone has to be in control of where all those aircraft are flying, at what altitude and speed, and by what route. The task falls to the various air traffic control agencies located in nearly every country around the world. Air traffic control is a vital component in the safety and economy of the nations of the world. Without a system to keep things moving safely, people and goods cannot be transported efficiently in a timely manner.

In November 2000, the top 20 airports in the United States handled over 316,000 takeoffs and landings (U.S. Bureau of Transportation Statistics Web site). Smaller busy airports often surround these big airports situated in heavy air-traffic areas. The round-the-clock coordination required to keep this system working is crucial. Air traffic controllers are the people who do the job. They are highly trained individuals who have to take yearly refresher training, as well as monthly computer-based instruction and evaluations of their use of proper phraseology.

There are different types of air traffic controllers who communicate with pilots, from the time the pilot calls for a clearance, through taxi, takeoff, cruise, arrival, landing, and taxiing to parking. Some controllers work in the tall towers that you've seen at airports; others stare at a radar screen miles from any airport. Some serve more than one role, for example, when a tower controller acts as a ground controller. (See **Towered or Controlled Operations** on page 13.)

Callsigns

How do the controllers keep track of who's who on the radio? All aircraft use a callsign. Callsigns are composed of the registration letters and numbers painted on the side of the plane for civilian aircraft, airline flight numbers for airliners, and often a combination of a branch name and a number for military flights. Most countries use only letters for callsigns; but the U.S. uses a combination of letters and numbers for many callsigns. You can change the callsign of your aircraft in Flight Simulator 2002 (see **Changing the callsign** on page 44).

WHAT IS AIR TRAFFIC CONTROL?

A few examples are:

“N700MS” for an aircraft that has the civilian registration “N700MS.” The callsign is spoken as “November seven zero zero Mike Sierra.” November, in this instance, is the letter with which all U.S. aircraft registrations begin.

“World Travel 455” for Flight 455 flown by World Travel Airlines. You generally say this as, “World Travel four fifty-five” or “World Travel four five five.”

“Navy 44F” for a military flight. This is spoken as “Navy four four Foxtrot.” However, there are many variations of military callsigns, depending on the branch of service, squadron designation, and what type of aircraft is being flown. You can search the Web for “military callsigns” to see some of the real-world military callsigns in use today.

Transponder (squawk) codes

In addition to the callsign, an aircraft can be identified on radar by a “squawk” code. Most modern aircraft, from the little guys to the big planes, are equipped with a radio called a transponder. The pilot can dial a series of four numbers (the transponder code, or squawk code) into the transponder. The transponder code identifies the aircraft on the ATC radar screen.

The standard real-world squawk code for VFR flight is 1200. If the flight is IFR (and in some instances while VFR) the controller will provide a squawk code to the pilot.

In Flight Simulator 2002, the Autotune feature sets the squawk codes for you. To learn more about Autotune, see **Using the Autotune feature** on page 46. All of the aircraft in Flight Simulator 2002, with the exception of the Schweizer 2–32 sailplane and the Sopwith Camel, are transponder-equipped.

ATC IN THE REAL WORLD

A common misperception about the air traffic control system is the idea that every aircraft in the skies is under the control of the ATC system. Actually, aircraft can fly in what is called non-towered, or uncontrolled, airspace, and in that case, they don't have to talk to anyone. Aircraft can also fly in controlled airspace under certain conditions without speaking to a controller. There are, however, certain conditions under which an aircraft is required to talk with ATC. We'll discuss those in the section, **Understanding Airspace** on page 28.

There are two sets of rules by which flights are conducted in most countries: visual flight rules (VFR) and instrument flight rules (IFR).

VFR flight

If the weather is above certain established standards, which roughly means that the visibility is above the minimum for flying by visual reference alone (even though the pilot may still navigate by cockpit instruments), pilots may make flights by visual flight rules. While VFR, a pilot may fly in to and out of uncontrolled

airports without any requirement to speak to a controller. VFR flights may also fly into airspace that requires them to speak to a controller.

IFR flight

When the weather deteriorates below the VFR standard, pilots are required to be "instrument rated" in order to fly. It's also a requirement in many countries to be instrument rated to fly above a certain altitude (18,000 feet, or Flight Level 180, in the U.S.). Most airliners in the U.S. fly on IFR flight plans, although in Flight Simulator 2002 you can choose to fly an airliner VFR. While IFR, a pilot is required to be in communication with ATC unless they are in areas where coverage is not available or they have a radio failure. In Flight Simulator 2002, there is ATC coverage over the entire world.

To learn more about IFR flight in Flight Simulator 2002, see **IFR Flight and ATC in Flight Simulator 2002** on page 31. The ATC Handbook is not designed to teach you instrument flying procedures. To learn more about instrument flying, see **Rod Machado's Ground School**.

ATC LANGUAGE

One of the intimidating things for many student pilots is the language of ATC, but it really isn't difficult to learn. It's structured and often abbreviated, but once you learn what to expect and what the appropriate response should be, using ATC adds more fun to your flight experience.

Flight Simulator 2002 is an ideal tool for learning to use the ATC system. Keep in mind that much of what you read about from here on is done for you automatically in Flight Simulator 2002. You don't have to know exactly what words to use, because the phraseology is spoken for you and the menu displays the correct choices for the particular phase of flight you're in. If you make a choice on the ATC menu in the simulator that you didn't intend, you can make another choice. The ATC menu is not a multiple-choice quiz, so don't feel like there's a wrong choice. The items listed are options; think of them as paths to different results. The choice you make depends on what you want to do.

There are a number of publications that real-world pilots use to become familiar with or to brush up on ATC phraseology. You might want to purchase a copy of one or more of the following:

Aeronautical Information Manual (AIM—Pilot / Controller Glossary. See the link on the Flight Simulator 2002 Web site to the **Sites to Visit** page.)

Aircraft Owners and Pilots Association—See the link on the Flight Simulator 2002 Web site.

Say Again, Please by Bob Gardner; Aviation Supplies & Academics (1995).

The Pilot's Radio Communications Handbook by Paul E. Illman; McGraw-Hill Professional Publishing (1998).

The Pilot's Reference to ATC Procedures and Phraseology by Mills and Archibald; Reavco Publishing (2000).

Comm1—Interactive software to learn IFR ATC procedures.

The keys to ATC communication are **clarity** and **brevity**. This is important, especially when traffic is heavy. For that reason, it often sounds like pilots and controllers are speaking a special language. They are—it's really just a type of shorthand. The phraseology you hear in Flight Simulator 2002 is based on standard ATC phraseology used in the real world.

ATC LANGUAGE

Think about the minimum amount of information you can give to someone and still communicate the relevant message. That's what you're shooting for with ATC communications. When you call a controller for the first time, the essential information is as follows:

1. Which controller you are calling (Seattle Approach, Denver Tower).
2. Who you are (Cessna N700MS, Baron N700MS).
3. Where you are.
4. What you want to do.

A typical transmission to a ground controller might fill in the blanks with the following:

1. Los Angeles Ground
2. Learjet N700MS
3. At parking
4. Requesting taxi for takeoff

Pilot: "Los Angeles Ground, Learjet N700MS, at parking, requesting taxi for takeoff."

You'll notice when responding to a communication from a controller that the phraseology you hear in Flight Simulator 2002 is often just repeating what the controller said, only briefer. This is how it's done in the real world. Many communications from pilots to controllers are a brief repetition of what the controller just said.

Here's an exchange between a pilot and controller. The pilot is VFR and wants to transition through the airspace over Boeing Field in Seattle.

Pilot: "Boeing Tower, Cessna N700MS is type Skylane, 2 miles west. Requesting transition."

Controller: "Cessna 0MS, transition approved. Report clear of Boeing tower airspace surface area."

Pilot: "0MS will report clear."

The pilot makes an initial request by stating whom she's addressing, the aircraft callsign (spoken as "November seven zero zero Mike Sierra"), what type of aircraft she's flying, where she is, and what she wants. The controller responds by approving the transition and requesting that the pilot report when clear of the airspace. When the pilot responds, she only repeats the relevant portion of the controller's transmission, so that the controller knows the pilot understands the

ATC LANGUAGE

expectation. Both the pilot and controller always use the aircraft callsign so there is no misunderstanding as to who's talking or being addressed.

If you think about ATC communications as following a standard, logical sequence, it's easier for you to become familiar with the style of communication. Some messages are longer and contain a bit more information than this, and some are shorter. The trick is to listen over and over to ATC phraseology until it becomes second nature.

VFR pilots carry charts that depict the size, shape, and altitude of airspace. Jeppesen SIMCharts are designed for use on IFR flights in Flight Simulator 2002. See the link to the Jeppesen's PCPilot Web site on the Flight Simulator 2002 Web site.

Some real-world pilots and simulator pilots even buy a handheld VHF radio and sit near their favorite airport to listen to the ATC chatter. You can also visit Web sites that connect you to live, real-world ATC transmissions. See "**Sites to Visit**" on the Flight Simulator Web site (<http://www.microsoft.com/games/fs2002/>).

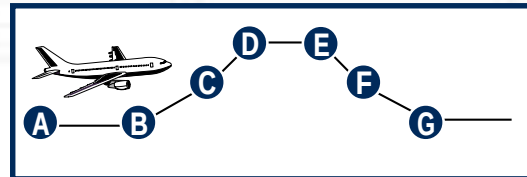
THE PHONETIC ALPHABET

It's imperative that communications over air traffic control frequencies be concise and understandable. Cockpits can often be noisy, and radio audio is not always crystal clear. For this reason, the international flying community uses a standard phonetic alphabet to identify callsigns and things like runway intersections, taxiways, etc. Pilots and controllers use this alphabet, and you should memorize it, just like a real pilot, because you'll be hearing it in Flight Simulator 2002 ATC.

A lfa	J uliet	S ierra
B ravo	K ilo	T ango
C harlie	L ima	U niform
D elta	M ike	V ictor
E cho	N ovember	W hiskey
F oxtrot	O scar	X -ray
G olf	P apa	Y ankee
H otel	Q uebec	Z ulu
I ndia	R omeo	

TOWERED, OR CONTROLLED, OPERATIONS

What goes up must come down, and flights progress in a logical sequence, from startup until shut down at the destination. The various controllers you need to contact to get clearances when using the ATC system are discussed in the following sections. In most cases, the different controllers communicate on separate frequency ranges, although it's possible for controllers to share frequencies when necessary. Frequencies for airports and instrument approaches can be found in Flight Simulator 2002's map display (type **Map** in the Help index).



From takeoff to landing, flights follow a logical progression. A-Preflight, B-Takeoff, C-Departure, D-En Route, E-Descent, F-Approach, G-Landing.

Note

If you use autotune in Flight Simulator 2002, tuning the radio to the correct frequency is done automatically, and the appropriate ATC menu for each phase of flight will appear. (See **Using the Autotune feature** on page 46.)

The following list of controllers assumes that your flight is taking off and landing at controlled airports—in other words, airports that require radio communications with controllers. In Flight Simulator 2002, as in the real world, you can take off and land at uncontrolled airports as well. (See **Non-towered Operations** on page 17.)

Clearance delivery

Before beginning a flight under instrument flight rules, you must obtain an IFR clearance from ATC. You have to create an IFR flight plan in Flight Simulator 2002 in order to get an IFR clearance (type **Flight Planner** in the Help index). After you file an IFR flight plan, the first controller you'll contact to begin your flight is clearance delivery. This controller will read an IFR clearance to you that defines your destination, route, altitudes, and any

TOWERED OR CONTROLLED OPERATIONS

special instructions ATC is expecting you to follow on your flight. You're required to read the clearance back to the controller.

Ground (taxiing to the runway)

Before you move from the parking area, listen to the automated weather reporting system if one is available (see page 19 of this Handbook).

To move from parking to the runway at controlled airports, you need to contact the ground controller (who's actually one of the controllers in the tower), and request to taxi to the runway. You should state a direction of departure in your request. The Flight Simulator 2002 ATC menu includes that choice. You can also choose to remain in the airport traffic pattern to practice takeoffs and landings. This is usually referred to as "touch and go." (For more about traffic patterns, see page 26.) Your taxi instructions from ground can include detailed directions to the active runway. For reasons of ground-traffic congestion, ground control may not clear you all the way to the runway at first. Listen carefully, and don't go beyond the point to which you are instructed to go. You are not authorized to taxi until

the ground controller issues instructions to do so. Stay on the ground frequency until you are ready for takeoff. Then, contact the tower (see page 46 to learn about autotune).

Tower (takeoff)

Once you get to the runway, complete your pre-flight checks, and are ready for takeoff, you must contact the tower controller. Tower controllers are in the tall tower that overlooks the airport's runways. They generally control the airspace up to 2,500 feet above the airport in a radius of four nautical miles around the airport. They use radar, visual sighting, and radio communications to issue clearances to take off and land, advise pilots of conflicting traffic, provide the current wind and altimeter information, and clear aircraft to transit the tower's airspace. Tower controllers in the real world usually rotate through assignments as clearance delivery and ground control. Listen carefully to any additional instructions tower may give you. You are not authorized to take off at the airport until the tower controller issues you a clearance to do so.

TOWERED OR CONTROLLED OPERATIONS

Approach / Departure

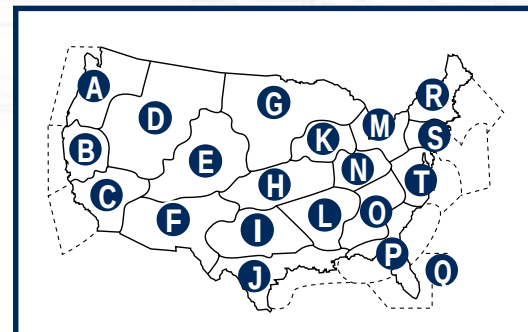
At many airports, there is an approach and departure controller who facilitates movement of IFR flights (and in certain circumstances VFR flights) out of congested areas, and may issue clearances to aircraft transiting the airspace controlled by departure. Tower can hand flights off to departure at any time after takeoff, usually about half a mile past the end of the runway. The departure controller will then handle getting the flight through the area and onto its route. The actual controller for this job is often in a Terminal Radar Approach Control (TRACON) building near a primary airport or co-located in the airport control tower. The same controllers handle approach and departure, and that's why it's not uncommon for you to be handed off from tower to approach control even when you're **departing** an airport. Don't let that confuse you.

Center

The Air Route Traffic Control Center (ARTCC, or center) controller handles a much larger area than other controllers.

In the U.S., there are 23 ARTCC facilities, each with multistate coverage. These controllers work in secure buildings that are often not even close to an airport. As a flight proceeds towards its destination, it's handed off from one center controller to the next, until it is handed off to an approach controller or tower.

In the United States, the areas controlled by the various ARTCC facilities are broken down as follows:



A. Seattle B. Oakland C. Los Angeles D. Salt Lake City
E. Denver F. Albuquerque G. Minneapolis H. Kansas City
I. Ft. Worth J. Houston K. Chicago L. Memphis M. Cleveland
N. Indianapolis O. Atlanta P. Jackson Q. Miami R. Boston
S. New York T. Washington

TOWERED OR CONTROLLED OPERATIONS

Approach

Approach control is a facility that provides radar and nonradar services to IFR and VFR aircraft arriving, departing, or transiting the airspace controlled by the approach facility. Essentially, this is a service to get aircraft from the en route phase of their flight down to the point where they are handed off to a tower for landing. In the case of IFR flights, approach may issue vectors (directions) to an aircraft to get them on to the final approach path for their destination airport. If an airport doesn't have a TRACON near it, this service may be provided by ARTCC.

Tower (landing)

The goal of all flights is to end safely back on the ground. The tower controller at the destination airport handles takeoffs, landings, and transiting aircraft. On an IFR flight, the pilot will be instructed when to contact the tower controller. On a VFR flight, it's customary to contact the tower about 10 to 15 miles from the airport after listening to automated information about the airport (see **Getting Airport Information** on page 19). The tower

controller issues instructions on how to approach the airport (how to enter the traffic pattern) and may provide traffic and weather information. You are not authorized to land at the airport until the tower controller issues you a clearance to do so.

Ground (taxiing to parking)

Once you are off the active runway, tower instructs you to contact the ground controller. Ground provides a route from your location to where you want to park. For reasons of ground-traffic congestion, ground control may not clear you all the way to parking in their first clearance. Listen carefully, and don't go beyond the point to which you are cleared. You are not authorized to taxi until the ground controller issues you a clearance to do so.

The Flight Simulator 2002 ATC team toured several towers, TRACONs, and ARTCCs in order to accurately model real-world ATC. The controllers at these facilities are usually receptive to giving tours to the public and strongly encourage real-world pilots to see what it's like on the other side of the microphone. Contact the tower at your local airport for more information.

NON-TOWERED OPERATIONS

Airports that do not have control facilities (ground, tower, approach, or departure) are called non-towered, or uncontrolled, airports. Pilots operating on or around these airports use a Common Traffic Advisory Frequency or CTAF (usually pronounced “see-taf”) to announce their intentions to other aircraft in the area. In addition, some airports have towers that don't operate 24 hours a day; these airports use CTAF when the tower is not in operation.

In Flight Simulator 2002, the ATC menu automatically lists CTAF message choices when operating at non-towered airports. When departing a CTAF airport, you should announce your intention to taxi and to take off. When you are 10 to 15 miles away from arrival at a CTAF airport, you should announce your intention to enter the traffic pattern and land. You address the other aircraft in the area as “Traffic.” By making these announcements, you're not only telling this information to pilots at the airport, you're announcing it to anyone else in the area listening on the same CTAF frequency (all the more reason to keep it brief, but informative).

The idea behind CTAF communications is similar to that at controlled facilities. You want to state the following:

1. Who you are talking to.
2. Who you are.
3. Where you are.
4. What you want to do.

An example of a flight out of Bremerton National Airport near Seattle, Washington might state this information as follows:

1. Bremerton Traffic
2. Mooney N700MS
3. Taking off
4. Runway 19, Bremerton

Pilot: “Bremerton Traffic, Mooney N700MS, taking off, Runway 19, northeast departure, Bremerton.”

Note that the order of the sentence isn't the primary issue. What's important is that you tell other aircraft that might be operating on or near Bremerton National Airport that you're about to launch into the skies from Runway 19 at Bremerton and that you're leaving the area to the northeast.

ACKNOWLEDGING ATC TRANSMISSIONS

It's important to acknowledge the transmissions you receive from air traffic controllers. The pilot's response to a message from ATC is often an abbreviated read-back of the controller's message.

Example:

Controller: "Cessna 0MS, turn right heading 270, descend and maintain 15,000, contact Seattle Approach on 134.85. Good day."

Pilot: "Right to 270, maintain 15,000, Approach on 134.85, Cessna 0MS."

When you receive a message from ATC in Flight Simulator 2002, the ATC menu automatically displays a selection of responses to be transmitted by you, the pilot. In the example shown, the following list appears in the ATC menu after the controller message. Choosing number 1 results in the pilot message shown in the previous paragraph:

1. Acknowledge instruction
2. Say again

ASKING ATC TO REPEAT MESSAGES

The standard terminology to use when asking ATC to repeat a transmission is to say the name of the controlling facility, your callsign, and "say again." For example, an approach controller might tell you to turn to a certain heading, descend, and tune the transponder to a particular squawk code. If you didn't get all of that transmission, you would say, "Seattle Approach, Cessna 700MS, say again."

When the controller has transmitted a message, the last item in the menu is "Say again." Select this menu item to hear the last controller message repeated.

Example:

1. Acknowledge instruction
2. Say again

GETTING AIRPORT INFORMATION (ATIS/ASOS/AWOS)

Selected airports have recorded or automated systems that give weather and non-control information to departing and arriving flights. The Automated Terminal Information Service (ATIS), Automated Surface Observation System (ASOS), and the Automated Weather Observation System (AWOS) broadcast airport information that is important for flight safety. These systems relieve frequency congestion by automating repetitive, but essential, information. Each time ATIS is updated (usually hourly or if there are changes in conditions at the airport), a new phonetic letter is assigned to the broadcast. When you tune an ATIS broadcast, you will hear it identified as "Information <phonetic letter such as Alfa>." In the real world, ASOS and AWOS broadcasts are updated minute-by-minute because they are automated systems that take weather readings constantly. In Flight Simulator 2002, ASOS and AWOS update at the same rate as ATIS. ASOS and AWOS do not give an identifier when they update.

Note

In Flight Simulator 2002, ATIS, ASOS, and AWOS information is updated when you make changes to the weather in the simulator. Although there are separate frequencies for ASOS and AWOS, the two services are the same in Flight Simulator 2002 and are reported as AWOS.

ATIS broadcasts include the following:

- Airport / facility name
- The phonetic code for the current broadcast (alpha, bravo, and so on.)
- Time of the weather broadcast in UTC (coordinated universal time, otherwise known as Greenwich Mean Time or Zulu time)
- Weather information that includes
 - Wind direction
 - Visibility
 - Cloud height and the ceiling
 - Temperature
 - Dew point
 - Altimeter setting
 - Other important weather observations, such as thunderstorms

GETTING AIRPORT INFORMATION (ATIS/ASOS/AWOS)

Feel free to listen numerous times to ATIS and AWOS broadcasts until the format becomes familiar to you.

To listen to a typical automated weather broadcast in Flight Simulator 2002:

1. On the **World** menu, select **Go to Airport**.
2. Type **Boeing Field** in the Airport Name box.
3. Click **OK**.
4. Press **SHIFT+2** to display the radios.
5. Press **C** to select the primary frequency numbers on Com 1 radio (the numbers to the left of the decimal).
6. Press the plus key (+) on the keyboard to change the numbers to **127** or use the mouse wheel.
7. Press the **C** key twice to select the secondary frequency numbers on Com 1 radio (the numbers to the right of the decimal).
8. Press the plus key (+) on the keyboard to change the numbers to **.75** or use the mouse wheel.
9. Click the white button labeled **STBY**.

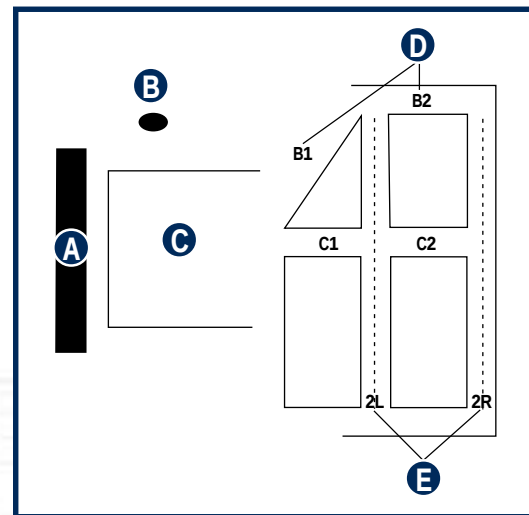
Note

Although you don't transmit to ATIS, the heading in the ATC menu always reads, "Choose a message to transmit to...". ATIS frequencies vary from airport to airport. Use the map view to get the ATIS frequency, or select **Tune ATIS** from the ATC menu to have autotune tune the frequency for you.

AIRPORTS FROM THE TOP DOWN

Large airports can be a confusing place. Even for commercial airline pilots, moving a big airplane with limited visibility around an unfamiliar airport can be tricky. There's help, however. You can use an Airport / Facility Directory (A / FD), which includes airport diagrams for large airports. A / FDs can be purchased from most pilot supply stores. You can also check out Jeppesen's PCPilot Web site for information on SIMCharts (see the link on the Flight Simulator 2002 Web site).

You can ask for progressive taxi instructions at towered airports (see **Getting to the Runway** on page 23), and the ground controller will direct you to the runway or to parking. Take a look at the following diagram. This is a top-down view of an airport. The layout of the runways, taxiways, and buildings is similar to what you'll find at airports in Flight Simulator 2002. Study the way the runways, taxiways, and parking are laid out. This will give you some idea of what to expect at airports in Flight Simulator 2002.



A. Terminal, B. Tower, C. Aircraft ramp, D. Taxiway designation, E. Runway designation

GETTING HANDED OFF

Given the long range of many modern aircraft, it's not surprising that they often fly through the airspace of multiple controllers along the route to their destination. Even going from the parking area to the runway, a pilot will often speak to different controllers at controlled airports.

When under the control of ATC, pilots get "handed off" from one controller to the next until they reach their destination. The handoff is simple: the controller instructs the pilot to contact the next controller and provides the frequency on which the contact should be made.

Examples:

Controller: "Cessna 0MS, contact Boeing Tower on 120.6."

Pilot: "Going to 120.6, Cessna 0MS."

Controller: "Cessna 0MS, contact Seattle Departure on 120.1."

Pilot: "Departure on 120.1, Cessna 0MS."

The pilot then tunes in the new frequency and notifies the new controller that he is on the controller's frequency.

Pilot: "Seattle Center, World Travel 1123 is level at FL280."

Pilot: "Denver Approach, Baron N700MS with you."

Pilot: "Jackson Departure, Learjet N700MS is climbing through 10,500 for FL320."

GETTING TO THE RUNWAY

It isn't just the air above the airport that is busy with traffic. If you've been to an airport recently, you know that ground-traffic congestion is another big safety consideration. Moving a lot of machinery full of people from parking to the runway is an often-complicated job, and it falls to the ground controller to accomplish it efficiently and safely. At towered airports, you must make a request to taxi before moving from the parking area or gate.

In Flight Simulator 2002, you can begin your flight at a parking spot or gate, depending on the airport and the type of aircraft you choose to fly (you can also start at the runway). If you're using autotune, the ground frequency is tuned for you (see **Using the Autotune feature** on page 46). You might find it easier to navigate to the runway if you switch to a view outside the cockpit (type **Spot Plane View** in the Help index).

Parking spots

Parking spots at many airports look similar to a public parking lot: a big expanse of pavement with airplanes parked wing-to-wing. From a parking spot, tune to the ground control fre-

quency and request to taxi to the active runway. Ground control will give you instructions on how they want you to proceed, and at larger airports, ground control will also indicate the specific taxiway or taxiways they want you to use en route to the runway.

Parking gates

You probably know from flying on commercial airliners that the big boys don't usually park in parking spots at huge commercial airports. They park at what is termed a "gate." A gate is attached to a terminal building, and in the real world, the gate is often permanently assigned to a particular airline. Gates are not assigned to a particular airline in Flight Simulator 2002.

From a gate, tune to the ground control frequency and request to "push back" (see next paragraph) from the gate and then request to taxi to the active runway. Ground control will give you instructions on how they want you to proceed, and at larger airports, ground control indicates the specific taxiway or taxiways they want you to use en route to the runway.

GETTING TO THE RUNWAY

Pushback

Most of the time, the aircraft parked at a gate in Flight Simulator 2002 will be the larger planes, like the Boeing 737, Boeing 777, and the Boeing 747. These planes must be pushed back from the gate before they can taxi to the runway. In the real world, this task is accomplished by a “tug,” a small tractor designed for the job. When you’re parked at a gate in Flight Simulator 2002, you’ll need to have your aircraft pushed back before you can request a taxi clearance. To get a pushback:

1. Press **SHIFT+P** to push straight back.

Or

1. Press **SHIFT+P** and then press 1 to turn the tail of the aircraft to the left as it pushes back.

Or

1. Press **SHIFT+P** and then press 2 to turn the tail of the aircraft to the right as it pushes back.
2. Press **SHIFT+P** again to stop moving back.

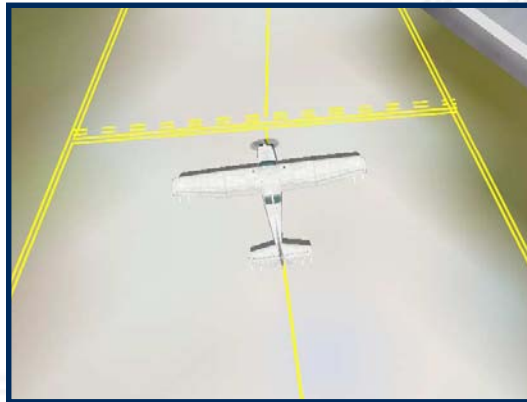
After the pushback, the menu includes a “Request taxi” option.

Taxiway markings

Painted lines on the taxiway mark the path between parking and the runway.

- The taxiway centerline is a continuous yellow line.
- Edges of taxiways are often marked with two parallel lines six inches apart.
- Taxiway hold lines consist of two continuous lines and two dashed lines perpendicular to the taxiway centerline. Pilots should stop short of the holding line for runup (the engine and instrument check before takeoff) or when instructed to hold short by ATC. Aircraft leaving a runway after landing are not clear of the runway until the aircraft is past the runway hold line.

GETTING TO THE RUNWAY



Aircraft at runway hold line.

Progressive taxi

In the real world, pilots often fly into or out of unfamiliar airports. It can be confusing to determine how to get from parking to the runway or vice versa. In this situation, the pilot can request progressive taxi instructions from the ground controller. You can do this in Flight Simulator 2002 at most towered airports as well. When you tune (or autotune) ground control, one of the ATC menu items is "Request Progressive

Taxi." Select this item, and a line is drawn on the taxiway from your present location to the runway or parking space. The line is drawn directly from your position to the runway or parking space, so you may have to look around the aircraft to see where it starts. Using Spot Plane view is helpful (type **Spot Plane View** in the Help index).

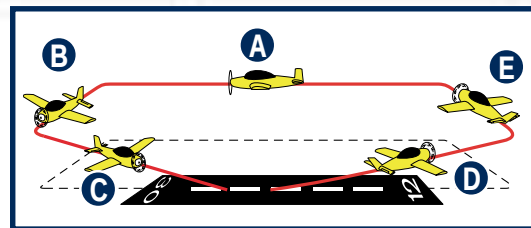
Hold short instructions

It's important to listen carefully to all instructions issued by ATC. Hold short instructions are issued by ground controllers when there is a potential for conflicting traffic. The ground controller will often ask you to hold short of the active runway and may tell you to hold short of any runways you have to cross on the way to the runway. If you receive a hold short instruction, heed the warning and acknowledge the controller's instruction. Taxiway hold lines consist of two continuous lines and two dashed lines perpendicular to the taxiway centerline (see the graphic in the **Taxiway markings** section on page 24).

TRAFFIC PATTERNS AT AIRPORTS

Imagine an intersection with a dozen or more highways feeding into it. If everyone just went in any direction they wanted, a chaotic and unsafe situation would be created. Similarly, traffic arriving and departing an airport needs to be orderly and logical. Pilots need to know what to expect from other pilots operating in the area. For this reason, there are standard patterns established for arriving and departing the airspace around airports.

There is only one active runway at any airport in Flight Simulator 2002. It is always the longest runway at the airport that is most closely aligned with the wind.



Standard airport traffic pattern: A. Downwind leg B. Base leg C. Final leg D. Upwind leg E. Crosswind leg

The standard pattern at most airports is a rectangle with left turns, but some airports have the pattern on the opposite side with right turns. Right-hand patterns

are used to avoid terrain or traffic patterns of nearby airports or to provide noise abatement. There are four sides, or "legs," to the traffic pattern:

Downwind: The aircraft is moving in the same direction as the wind, and the runway is to the pilot's left or right, lying parallel to her course.

Base: The wind and runway are to the pilot's left or right, perpendicular to her course.

Final: The aircraft is headed into the wind, and the runway is dead ahead.

Upwind: The aircraft is flying into the wind, and the runway is behind the aircraft.

When flying into any airport, it's good practice and a safe habit to contact the airport 10 to 15 miles out and communicate your intention to land. State where you are, where you're landing, and, if the airport is uncontrolled, how you're going to enter the pattern. You'll hear these position reports in Flight Simulator 2002 when you select a landing airport and landing type (full stop, touch and go, and so on.) from the ATC menu.

TRAFFIC PATTERNS AT AIRPORTS

A typical call at an uncontrolled airport might sound like this:

Pilot: “Bremerton Traffic, Cessna N700MS is 10 miles northwest, 2,500, inbound full stop, left traffic, Runway 19, Bremerton.”

The pilot is announcing to other air traffic on the common frequency that he is 10 miles from the airport at 2,500 feet. The pilot intends to enter the pattern on the left downwind leg, land, and make a full stop on Runway 19 at Bremerton. You don't have to know exactly how far away you are in Flight Simulator 2002 because the distance is calculated for you. When you choose an arrival message from the ATC menu, you'll hear the distance from the airport stated in the message.

At a controlled airport that has ATIS, the call would sound like this:

Pilot: “Boeing Tower, Cessna N700MS is 10 miles northwest, with Bravo, full stop.”

The pilot addresses the controller, states the aircraft callsign, where he is, that he has the ATIS airport information (“with Bravo”), and that he wants to make a full-stop landing. The tower controller responds with instructions and possibly traffic information. The pilot is told how the controller wants the pilot to enter the traffic pattern.

Controller: “Cessna N700MS, Boeing Tower, make right traffic, Runway 31R.”

In this case, the controller tells the Cessna to enter the downwind for Runway 31R using “right traffic,” or making right turns in the pattern.

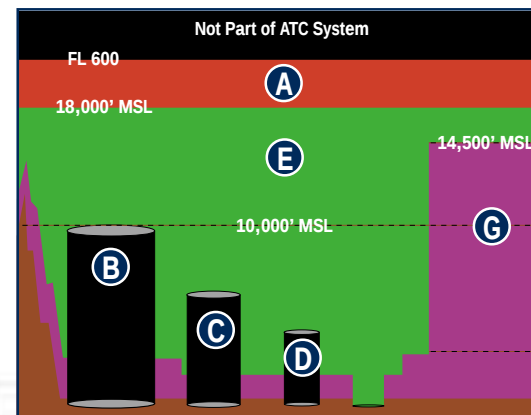
UNDERSTANDING AIRSPACE

It's not essential that you understand the way airspace is carved up in order to enjoy using ATC and radio communications in Flight Simulator 2002. In Flight Simulator 2002, the ATC menu changes according to various factors, some having to do with what type of airspace you're in or approaching. In the real world, you're required to speak with a controller to enter certain classes of airspace. If you don't speak to a controller in Flight Simulator 2002, we won't take your pilot certificate away. However, if you're interested in what various airspace classifications mean in the United States, read on.

U.S. airspace classifications

Class A (alfa)

Airspace from 18,000 ft (5,486 m) above mean sea level (MSL) up to and including FL600 (Flight Level 600 = 60,000 ft / 18,288 m). Unless otherwise authorized, pilots must operate under instrument flight rules in Class A airspace.



A-Class Alfa, B-Class Bravo, C-Class Charlie, D-Class Delta, E-Class Echo, G-Class Golf

Class B (bravo)

Controlled airspace from the surface to 10,000 ft (3,048 m) AGL surrounding the busiest airports. Class B airspace volumes are individually tailored, but usually include airspace within 30 miles of the primary airport. It's often referred to as an upside-down wedding cake, and you can see why looking at the graphic

UNDERSTANDING AIRSPACE

(although not all Class B volumes are shaped this way). To operate in Class B airspace, there are requirements in terms of pilot certification, weather conditions, and aircraft equipment in the real world that you don't need to worry about in Flight Simulator 2002. You're required to contact and receive a clearance from ATC prior to entering Class B airspace. In Flight Simulator 2002, ATC behaves as though Flight Following service is automatic when departing airports in Class B or Class C airspace.

Class C (charlie)

Airspace from the surface to 4,000 ft (1,219 m) AGL above an airport with an operational control tower and that is serviced by a TRACON. Class C airspace is individually tailored for the airport, but it usually extends for five nautical miles (9.26 km) from the surface to 4,000 ft, and then has a shelf area extending to 10 nautical miles (18.52 km) from 1,200 ft (366 m) to 4,000 ft. You're required to establish communication with ATC prior to entering Class C airspace.

Class D (delta)

Airspace from the surface to 2,500 ft (762 m) MSL above an airport with an operational control tower. Class D airspace is individually tailored for the airport it surrounds. You're required to establish communication with ATC prior to entering Class D airspace.

Class E (echo)

All other controlled airspace that is not Class A, B, C, or D. You're not required to communicate with anyone when flying in Class E airspace unless the weather is IFR.

Class G (golf)

Uncontrolled airspace with three different altitude levels: from the surface up to and including 1,200 ft (365.76 m) above ground level (AGL), more than 1,200 ft AGL but less than 10,000 ft (3,048 m) MSL, and at or above 10,000 ft MSL up to but not including 14,500 ft (4,420 m) MSL. You're not required to communicate with anyone when flying in Class G airspace.

VFR FLIGHT AND ATC IN FLIGHT SIMULATOR 2002

There are two sets of rules by which flights are conducted in most countries: visual flight rules (VFR) and instrument flight rules (IFR). If the weather is above certain established standards, which roughly means that the visibility is above the minimum for flying by visual reference alone (even though the pilot may still navigate by cockpit instruments), pilots may make flights by visual flight rules. While VFR, a pilot may fly into and out of uncontrolled airports without any requirement to speak to a controller. VFR flights with requirements to speak to a controller are listed in the previous section.

Just as in the real world, you don't have to interact with ATC when flying VFR in Flight Simulator 2002. In fact, in Flight Simulator, it's even more flexible, because you don't have to talk with controllers even in VFR situations that would require communication in the real world.

The point to remember when flying VFR in Flight Simulator is that ATC is there to help you. You can communicate when flying into airports, request transitions through controlled airspace, and request Flight Following service (see **Airspace transitions** on page 39 and **Flight Following** on page 40).

Another advantage of talking with controllers while under VFR is that the controller will tell you about air traffic flying near you. The controller won't tell you about every aircraft, but will help keep you advised when she's not busy (see Traffic Messages from ATC on page 36).

You can use the Flight Planner to plan a trip from one airport to another in VFR conditions (type Flight Planner in the Help index). One advantage to this is that you can use the GPS to follow your route and even have the autopilot track it for you. You're not filing a flight plan when you use the Flight Planner under VFR, so there's no flight plan that you must cancel at the end of your flight (as is required in the real world).

The times when you will communicate with ATC while VFR in Flight Simulator 2002 are as follows (if you want to play by the real-world airspace regulations shown on page 28):

- Operating within or transitioning Class B airspace
- Operating within or transitioning Class C airspace
- Operating within or transitioning Class D airspace
- While using Flight Following

IFR FLIGHT AND ATC IN FLIGHT SIMULATOR 2002

Flight in instrument meteorological conditions (IMC) is often the most challenging and interesting kind of flying a pilot can do. You can set weather conditions in Flight Simulator 2002 to be as easy or as difficult as you like, or even download real-world weather off the World Wide Web. To learn more about setting weather, type **Weather** in the Help index.

The ATC Handbook is not designed to teach you instrument flying procedures. To learn more about instrument flying, see **Rod Machado's Ground School**. If there are terms anywhere in this Handbook that you don't understand, see the **ATC Glossary** on page 60.

Getting an IFR clearance

Before flying IFR in Flight Simulator 2002, you have to create a flight plan. To learn more about using the Flight Planner, type **Flight Planner** in the Help index. Once you've created a flight plan, you can call clearance delivery to get your clearance. It will be read to you, and you'll be required to read it back. All clear-

ances in Flight Simulator 2002 are issued as filed, and route details are not included in the clearance. It's possible in rare instances that Approach frequency boundaries bisect an airport. When that happens, you might get a different departure frequency in your IFR clearance than you get from the tower when they hand you off, because you cross the boundary during taxi or takeoff.

DPs (departure procedures) and STARs (standard terminal arrival routes)

Routes incorporating published DPs or STARs are not issued in clearances and cannot be requested in Flight Simulator 2002. You can still create these routes, however, by customizing your waypoints in the Flight Planner file (files with a .pln extension are Flight Planner files). You will still hear ATC clear your flight "as filed," without including a DP or STAR. To learn more about customizing waypoints in routes, type **Creating Custom Waypoints** in the Help index.

Canceling IFR

If for any reason during your flight you want to cancel IFR, you may do so.

“Cancel IFR” appears as one of the menu options during most phases of an IFR flight. When you choose this menu item, you’ll be asked to confirm that you want to cancel IFR. This prevents inadvertent cancellation of an IFR flight plan.

If you cancel IFR on the way to the runway, ATC will instruct you to taxi to the runway to request a VFR departure from the tower. If you cancel IFR above 18,000 ft, you will not be instructed to descend below 18,000 ft as you would be in the real world.

ATC cancels your IFR flight plan automatically under the following circumstances (ATC notifies you in all instances except the first):

- You land at your filed destination.
- You exceed a clearance void time.
- You exceed a clearance and don’t respond to the controller’s instructions to correct the error.
- You don’t respond to controller transmissions.

- You’re handed off to a controller and you land somewhere other than your destination.

ILS approaches

At Flight Simulator 2002 airports with precision approaches, the ILS aligned with the active runway is the default instrument approach. The controller will vector you onto the final approach course unless you request the full procedure. If you declare a missed approach, the approach controller will direct you back for another attempt unless you choose a different action in the ATC menu.

Visual approaches

It’s frequently the case in the real world that if conditions allow, controllers will clear pilots for a visual approach. The runway or airport environment must be in sight, or you must be able to follow other traffic to the airport to be cleared for a visual approach. When flying a precision approach in Flight Simulator 2002, “Request visual approach” will be one of the ATC menu items as soon as you’re cleared for the ILS.

Missed approaches

If you make the approach and either can't see the runway or are practicing multiple approaches, you can declare a missed approach. You'll be routed back onto the approach course to attempt the approach again. "Declare missed approach" will be one of the ATC menu items as soon as you're cleared for the approach.

Full procedure approaches

You cannot request to fly the full procedure during ILS approaches. If you fly the full procedure, ATC in Flight Simulator will detect that you're off the course that you were cleared to fly.

Non-precision approaches

Non-precision approaches are not supported by ATC in this version of Flight Simulator. While you can still fly non-precision approaches (because the nav aids used for the approaches are in the simulator), you can't request a non-precision approach, and clearances will not be issued for non-precision approaches.

Non-aligned approaches

If the only instrument approach available at a particular airport is not aligned with the active runway, then you, as pilot, are responsible for knowing how to land. You must circle to land if the final approach course is more than 30 degrees from the runway heading.

Vectors

In Flight Simulator 2002, ATC issues vectors to you when you're making instrument approaches and when you're straying off your filed course. The vector includes an instruction to turn left or right and a new heading to follow.

Requesting flight to the alternate airport

Diversions to an alternate airport are not supported by Flight Simulator 2002.

Non-towered IFR

You can create IFR flight plans into and out of uncontrolled airports in Flight Simulator 2002. When departing IFR at an uncontrolled airport, ATC issues a clearance and a clearance void time. If you

IFR FLIGHT AND ATC IN FLIGHT SIMULATOR 2002

do not contact the departure controller by the clearance void time, your IFR flight plan is cancelled (Flight Simulator 2002 ATC notifies you of the cancellation). All clearance void times are 30 minutes from the time that the clearance is read.

When arriving at a non-towered airport on an IFR flight plan, approach control clears you for the approach and instructs you to change to the advisory frequency. Once you switch to the advisory frequency, the ATC menu includes two missed approach options. You can choose to announce the missed approach to traffic on the advisory frequency, or you can bypass that and choose to announce the missed approach directly to the approach controller. When you choose to notify the approach controller that you've gone missed approach, you're routed back onto the course to attempt the approach again. You can cancel IFR and request a VFR landing at this point.

IFR altitudes

The Flight Planner in Flight Simulator 2002 assigns an altitude based on your route (type **Flight Planner** in the Help index). However, you can choose a different altitude in the Flight Planner. Whether you use the default altitude assigned by the Flight Planner or set an altitude yourself, this is the altitude to which you'll be cleared in your IFR clearance.

GPS and instrument flights

Use the GPS in Flight Simulator 2002 to lessen the workload on instrument flights. When you couple the autopilot to the GPS, the aircraft automatically follows ATC vectors since the ATC system in Flight Simulator 2002 uses GPS waypoints, even on airways.

ATC ALERT MESSAGES

In Flight Simulator 2002, ATC alerts you to situations in which certain things require your attention. Rather than scolding you, alert messages are designed to help you stay within expected parameters. Sometimes it's just a gentle reminder to help you stay on course, but

also includes giving you vectors (directions) to avoid terrain. In most cases, you must either acknowledge the transmission or take the corrective action that the controller instructs you to take. The following table provides some examples.

Examples:

Controller	Reason for alert	Action required
Cessna 1228T, did you hear my last transmission?	Pilot has not acknowledged an instruction from ATC.	Acknowledge controller's transmission.
Baron 43X, ATC services terminated. Good day.	Aircraft has exceeded the extent of ATC coverage.	No action required.
World Travel 899, you are not cleared to takeoff.	Aircraft has taxied onto the active runway or taken off without clearance.	Stop immediately if on the ground, or fly away from the area if in the air.
Extra 77CR, you were not cleared to land. Clear the runway.	Aircraft has landed without clearance.	Clear the runway.

TRAFFIC MESSAGES FROM ATC

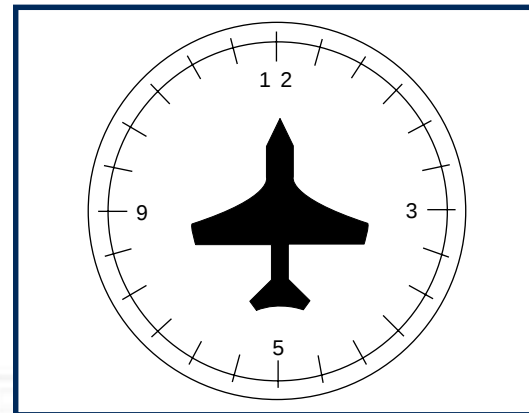
You're not alone out there. Motoring around both the real skies and the Flight Simulator skies are other aircraft that may conflict with your flight path. Air traffic controllers may advise you of potential conflicts. These are known as “traffic calls,” and they follow a standard format:

1. Who the controller is addressing.
2. Where the traffic is.
3. What the traffic is.
4. What you should do.

Example:

Controller: “Cessna 0MS, traffic is five miles, two o'clock, 7,500, type 767. Report them in sight.”

The controller in this example is addressing Cessna 0MS. A Boeing 767 is five miles from Cessna 0MS at 7,500 feet. “Two o'clock” refers to the position of the traffic in relation to Cessna 0MS.



In other words, if Cessna 0MS was sitting on the face of a clock with its nose towards the 12, the little hand would point at the 2 on the clock—that is, the relative position at which the Boeing 767 is located. The controller wants to know if Cessna 0MS sees the traffic and wants 0MS to report if or when the traffic is in sight.

TRAFFIC MESSAGES FROM ATC

The pilot's response might be:

Pilot: "Traffic in sight, Cessna 0MS."

Or

Pilot: "Traffic not in sight, Cessna 0MS."

Other aircraft in the Flight Simulator 2002 world are marked with text labels. You will see the aircraft's callsign attached as a text label as the aircraft moves.



Aircraft 888RW identified as 0.3 miles away.

Aircraft not seen

If Cessna 0MS never sees the Boeing 767 (despite the size of this aircraft, it's more difficult than you might think to spot other planes in the sky), the controller may let them know when the traffic is no longer important to the pilot. The pilot might hear:

Controller: "Cessna 0MS, traffic no longer a factor."

Type unknown

Sometimes, the controller can only tell the pilot where the traffic is relative to the pilot's position. Then the pilot hears a position report, such as "...traffic is two o'clock..." If the aircraft referred to in the traffic report has a Mode C transponder (all aircraft in Flight Simulator 2002 are Mode C-equipped except the Schweizer and the Sopwith), the controller can give altitude information in the traffic call, as in, "...traffic is two o'clock, 5,000..."

If the controller doesn't know the type of aircraft, she will simply say, "...type unknown." If you have imported add-on aircraft into Flight Simulator 2002, you may hear them referred to in traffic reports as "type unknown."

TRAFFIC MESSAGES FROM ATC

Traffic alerts

When traffic is close and on a course and altitude that could present a hazard, the controller may begin the traffic call with the phrase, “Traffic Alert!” That’s a cue to look quickly and carefully in the direction of the traffic. You may have to maneuver to avoid a collision.

When you are operating under VFR, ATC makes traffic calls only under certain circumstances. The controller may not advise you of *all* traffic that might conflict with your flight.

IFR flights and traffic calls

If the pilot is on an IFR flight plan, ATC is watching the traffic around them. However, the controller is responsible for maintaining separation between aircraft within her airspace because, in theory, IFR aircraft are in clouds and the pilots can’t see each other.

VFR flights and traffic calls

If the pilot is operating under VFR rules, traffic calls are given when the pilot is transitioning airspace and talking to a controller, when the pilot is using Flight Following, and when the pilot is in the airport terminal airspace, provided the controller isn’t too busy. Under VFR rules, it’s the pilot’s responsibility to maintain separation from other aircraft.

Speed adjustments to accommodate traffic

Controllers may also ask you to adjust your speed to accommodate aircraft ahead or behind you that are slower or faster than your aircraft.

AIRSPACE TRANSITIONS

The shortest route between any two points is a straight line, and sometimes, this means flying through controlled airspace. The airspace might be busy or have traffic that is bigger and faster than the pilot's aircraft (or vice versa), and it makes good sense for the pilot to talk to a controller while in this airspace. The pilot could avoid this by flying around the airspace (which requires that the pilot have a sectional chart depicting the airspace), but that might mean adding considerable time and distance to the flight.

Getting a transition clearance is easy in Flight Simulator 2002. Whenever you fly towards airspace in which a transition clearance is available or required, the ATC menu includes "Request transition." When you select this item, you'll hear something like this:

Pilot: "Seattle Approach, Cessna N700MS, 10 miles east of Boeing Field, 5,000. Request clearance to transition Seattle Class B airspace."

Controller: "Cessna 0MS, Seattle Approach, squawk 2212."

Pilot: "Squawk 2212, Cessna 0MS."

Controller: "Cessna 0MS, radar contact seven miles east of Boeing Field, 5,000. Cleared through the Seattle Class B airspace."

The pilot has addressed the ARTCC controller in Seattle stating who he is, where he is, at what altitude he's flying, and what he wants from the controller. The controller called 0MS and told him to dial 2212 into his transponder. 0MS responded by reading back the squawk code. Once the controller acquired 0MS's target on the radar screen, the controller told 0MS that she had radar contact, and then she cleared the Cessna through Seattle's Class B airspace. In the case of Class D airspace, the menu will display the name of the controller. That way you'll be able to choose which towered airspace you want to transition.

Once through the airspace, the ATC menu will contain the item "Report clear of airspace." Select this item to let the controller know you're clear of the airspace.

FLIGHT FOLLOWING

Flight Following is a radar service for VFR aircraft that provides traffic advisories when the controller isn't too busy. It's a useful service when pilots are flying cross-country and may have to transition multiple controllers' airspaces, as they don't have to request a transition from each controller along the way and can get traffic advisories. It also means someone knows where they are, which can be reassuring if the engine quits over Death Valley or the Sahara. Keep in mind, however, that the pilot is still responsible for navigation while using Flight Following.

Any time you're in airspace where Flight Following is available and you're VFR in Flight Simulator 2002, the ATC menu lists "Request Flight Following" as one of the options. When you select this item, you'll hear something like this:

Pilot: "Seattle Center, Cessna N700MS is type Skylane, five miles east of Bremerton National Airport, for Flight Following."

Controller: "Cessna 0MS, Seattle Center, squawk 2212."

Pilot: "Squawk 2212, Cessna 0MS."

Controller: "Cessna 0MS, radar contact seven miles east of Bremerton, 5,000. Current altimeter 3102."

Pilot: "Roger, Cessna 0MS."

The pilot has addressed the ARTCC controller in Seattle stating who she is, where she is, at what altitude she's flying, and what she wants from the controller. The controller responded to 0MS, telling her to dial 2212 into her transponder. 0MS responded by reading back the squawk code. Once the controller acquired 0MS's target on the radar screen, the controller told the pilot that he had radar contact and then gave her the current local altimeter setting.

ALTIMETER SETTINGS

The altimeter in an aircraft provides pilots with information about their altitude. In other words, it tells them how high above mean sea level (MSL) they are. Altimeters work by measuring differences in atmospheric pressure at different altitudes. It's critical to know your altitude, especially when in the clouds, and the altimeter reading changes depending on local atmospheric pressure. For a more complete explanation of altimeters, see **Rod Machado's Ground School**.

In some countries, altimeter settings are measured in inches of mercury, and in other countries, in millibars. The controllers issue current local altimeter settings by stating the atmospheric pressure in inches of mercury or millibars. The pilot must then dial this setting into the Kollsman window of the altimeter (the small window on the altimeter face).



Controllers often provide local altimeter readings when the pilot first contacts the controller. Listen for phraseology similar to the following:

Controller: "...current altimeter 29.92."

ALTIMETER SETTINGS

When you hear this, check the current altimeter setting in your aircraft to make sure it matches the one the controller gave you. In Flight Simulator 2002, you can choose whether the altimeter setting is in inches of mercury (U.S.) or millibars (metric).

To switch between U.S. and metric altimeter settings:

1. From the Options menu, choose **Settings / International**.
2. Choose the settings you want, and then click **OK**.

To change the altimeter settings:

Click the altimeter calibration knob on the altimeter.

HELICOPTER OPERATIONS

Helicopter flights are no different from fixed-wing flights with regards to ATC in Flight Simulator 2002. You can request takeoff and landing clearance and fly IFR approaches in the Bell 206. There are no special taxi or pattern-entry instructions issued to helicopter flights.

If you call the ground controller, you'll still be told to taxi to a runway to takeoff. You'll have to hover taxi to and land just short of the runway before the menu will list the tower controller options.

Alternatively, you can just take off from your parking spot without ever contacting ATC. After takeoff, the menu changes to a list of airports at which to land.

ATC will not issue clearances to land on buildings, ships, or anywhere except an airport.

ATC does not recognize that a helicopter is different from any other aircraft, but when you land directly in a parking spot, the menu will change to display takeoff options (as opposed to options for taxiing in from a runway like you would see after landing on a runway).

USING ATC IN FLIGHT SIMULATOR 2002

Introduction

If you are a real-world pilot or if you already have knowledge of the ATC system, you'll love this new feature. If you're new to ATC, we've worked hard to make your introduction to the system fun and easy (see the ATC lesson in **Rod Machado's Ground School**). The main thing to keep in mind is that the interaction between pilots and controllers is a kind of conversation. You'll either make requests from controllers or respond to their instructions. You may also want to check out **Real-World Differences** on page 55.

There are two aspects to learning ATC in Flight Simulator 2002: learning the ATC system and language, and learning the ATC menu. Learning the system involves knowing who to talk to and what to expect from the ATC controllers who are communicating with you (see **What is Air Traffic Control?** on page 7). Learning ATC commands means knowing what choices to make when sending messages to ATC that are appropriate to your current flight. The ATC menu displays the response choices available to you. To learn more, see **Using the ATC Menu** on page 49.

When two people attempt to transmit a radio message at the same time on the same frequency, you hear an unpleasant squeal over the radio. In pilot parlance, this is known as getting "stepped on." Stepping on someone else's transmission in Flight Simulator 2002 means ATC won't hear your transmission. Time your transmissions so that you don't step on other pilots or controllers.

The next several pages explain how to choose the pilot voice you want to use, how to use the Autotune feature, how to tune radios manually, and other nuts and bolts of using ATC in Flight Simulator 2002. Take your time, have fun, and remember, as real as this feels, it's a simulator. No one will yell at you or take your pilot certificate away if you make a mistake, and ATC is there to help guide you.

Changing the callsign

In Flight Simulator 2002, you can change the ATC name of your aircraft, thus changing the callsign used by the pilot and ATC. Changing the airline name in the ATC Name dialog box *will not* change the airline livery painted on the outside of the aircraft.

USING ATC IN FLIGHT SIMULATOR 2002

To change the ATC name:

1. From the **Welcome** screen click **Create a Flight**, and then under **Current Aircraft**, click **Change**.
-or-
1. On the Aircraft menu, choose **Select Aircraft**.
2. In the ATC Name box, click **Change**.
3. Make selections in the ATC Name dialog box.
4. Click **OK**.

You can change the aircraft tail number to any combination of numbers and letters. The pilot and controller use the entire tail number during initial contact. The tail number is abbreviated to the last three characters of the callsign in subsequent contacts. If you always want to hear a short callsign (for example, if you never want to hear the “November” in U.S. callsigns), create a tail number that is short.

To change the tail number:

1. Double-click the **Tail number** box.
2. Type a new aircraft identification.

To change the airline name:

1. Click the **Airline name** list.
2. Select a new airline name from the list.

To change the flight number:

1. Double-click the **Flight number** box.
2. Type a new flight number.

To enable the airline callsign:

Select the **Use airline callsign** check box. If this checkbox is not selected, ATC will use the aircraft tail number.

Jumbo jets in the real world are often addressed as “Heavy” by ATC (“World Travel 1123 “Heavy...””).

To hear the word “Heavy” included in the callsign:

Select the **Append “Heavy” to callsign** check box.

USING ATC IN FLIGHT SIMULATOR 2002

Choosing a pilot voice

When you select an item from the ATC menu, you'll see the text of the message onscreen and hear the pilot voice saying the phrase. That pilot voice represents you. Your messages to controllers are audible (unless you turn the pilot voice off. To learn more, see **ATC settings** on page 51), as are the controller messages to you and other planes.

When a phrase that represents a message by you, the pilot, is played, the message is in orange text. The controller messages are in green text

There are 10 different voices that you can choose from as your pilot voice. If the **Pilot Voice** check box is not selected, you can't choose a pilot voice and you won't hear a voice when you send a message to ATC.

To choose a voice:

1. On the **Welcome** screen, click **Settings** and then click **ATC**.
-Or-
1. On the **Options** menu, click **Settings** and then **ATC**.
2. Select the **Pilot Voice** check box.

3. In the **Pilot Voice** list, click the voice you want to use as your pilot voice.

Using the Autotune feature

Switching radio frequencies is a breeze if you use the Autotune feature because the switching is done for you automatically. This frees you to concentrate on flying the aircraft and navigating to your destination. When you select an item from the ATC menu to contact a new controller (for example "Contact Approach"), the radio frequency changes to the new controller's frequency automatically.

When using the Autotune feature, you may not hear anything on the radio until you choose an item from the ATC menu, even if there are other aircraft talking to ATC (unless you're already tuned to an active frequency). That's because the radio is not tuned until you initiate contact by choosing a message from the menu.

Tuning the radios manually

Pilots who want to do it all can bypass the Autotune feature by tuning the radios by hand. This means you'll have to tune the radios manually each time a frequency change is required. In addition to this section, see the **Using the Radios** video.

USING ATC IN FLIGHT SIMULATOR 2002

New menu items appear in the ATC window when you tune the radio to a new frequency. If you want to see choices for messages to a tower controller, for example, you must first tune the radio to the tower frequency.

To tune a new frequency into a communication, navigation, or ADF radio:

1. Press **SHIFT+2**, or click on the panel to bring up the radio stack.



radio icon button



1-Standby frequency, 2-Standby flip/flop switch

2. Position the pointer over the radio frequency you want to change.
 3. Use the mouse wheel to change the frequency up or down.
- Or-

1. Point to the standby frequency numbers. The pointer changes to a hand.
2. Move the pointer left or right. A plus sign (+) or minus sign (-) appears on it.
3. To increase the frequency numbers, position the pointer so you see a plus sign, and then click the left mouse button.
4. To decrease the frequency numbers, position the pointer so you see a minus sign, and then click the left mouse button.
5. When you have the correct frequency dialed in, click the white button labeled STBY (sometimes called the flip / flop switch).

-Or-

1. Press **C** to select the primary frequency numbers on Com 1 radio (the numbers to the left of the decimal). Press **C+2** to select the primary frequency numbers on Com 2 radio.
2. Press the plus key (+) to increase the frequency numbers.

USING ATC IN FLIGHT SIMULATOR 2002

3. Press the minus key (-) to decrease the frequency numbers.
4. Press the **C** key twice to select the secondary frequency numbers on Com 1 radio (the numbers to the right of the decimal). Press the **C** key twice, and then press **2** to select the secondary frequency numbers on Com 2 radio.
5. Press the plus key (+) to increase the frequency numbers.
6. Press the minus key (-) to decrease the frequency numbers.

This also works for the NAV, ADF, and transponder radios by first pressing the **N** (**N+2** for Nav 2), **A**, and **T** keys, respectively, or by using the mouse wheel.

The audio panel

Use the audio panel's **Com 1**, **Com 2**, or **Both** buttons to choose which radios you want to transmit on and listen to. To choose a radio to autotune, transmit, and receive on, click either the Com 1 or Com 2 button on the Audio panel. If you click the Both button, you will still be transmitting on the radio you had

previously selected, but listening to both radios. This can be especially helpful on approach, since you don't want to tune away from the controller in order to hear ATIS (if you do, you'll miss traffic calls). You can also listen to the audio identifiers for the nav radios by selecting their buttons on the audio panel as well. If you have controllers tuned in on both radios, and the Both button is lit on the audio panel, it will sound very busy and perhaps be difficult to understand.



Audio panel for the Cessnas. The audio panel may look different in other aircraft.

To use the audio panel:

Click the button for the radio you want to listen to. When the green light on the button is lit, the audio channel for that radio is active.

To listen to more than one radio at the same time:

Click the **Both** button on the audio panel.

USING ATC IN FLIGHT SIMULATOR 2002

To find a particular communication or navigation frequency:

1. Use real-world charts.
-Or-
1. On the **World** menu, select **Map view**.
2. Double-click the airport or navaid whose frequency you are looking for (you may have to use the map's Zoom feature).

Using the ATC menu

Communicating with ATC in Flight Simulator 2002 is simple and mimics the way pilots and controllers communicate in the real world. For example, the pilot makes a request, followed by a response from the controller, or the controller gives an instruction, followed by a pilot acknowledgement.

The ATC menu is in a transparent window that can be moved and resized. The ATC menu lists the available commands

specific to the current state of the flight. You can click items on the panel without moving the ATC menu. Some menus are layered, meaning that when you select an item, a new menu list appears, requiring another selection before the message is sent to ATC (see the example at the end of this section).

At non-towered airports, your messages are directed to other pilots in the area, not a controller, so don't expect a response.

The menu does not always contain messages to transmit. When the menu contains messages to transmit, the top line in the menu will read, **"Choose a message to transmit to agent name."** When the menu contains no messages to transmit, the top line in the menu will read, **"There are currently no messages to transmit to agent name."**

USING ATC IN FLIGHT SIMULATOR 2002



To display or hide the ATC window:

Press the ACCENT key
or SCROLL LOCK.



-Or-

Click the ATC panel icon.

-Or-

On the **Views** menu, click
Air Traffic Control.



ATC panel icon

To select an item from the ATC menu:

If the ATC window is not visible, press the
the ACCENT or SCROLL LOCK key.

Press the number key at the top of your
keyboard that tunes the frequency you
want to tune, or that corresponds to the
message you want to transmit (you
cannot use the numeric keypad to make
selections on the ATC menu). To tune to
a new agent, choose "Tune..." from the
menu to display a list of messages to
transmit to a particular agent.

The ATC menu overrides other com-
mands of the simulator. For example, if
you have something mapped to the 1 key,
and the ATC menu is open, pressing 1
will select the first item in the ATC menu.

To return to a previous menu:

On layered menus in which you have to
select from more than one list of items
before the message is sent, select the
number on the menu that corresponds to
(—Back—) to return to the previous menu.

USING ATC IN FLIGHT SIMULATOR 2002

Selecting a landing airport presents a good example. The first menu may have the following selections:

1. Request Flight Following
2. Select landing airport

If you selected number 2, the next menu would list all of the available landing airports nearby. After selecting an airport, the third menu would look something like this:

1. Request touch and go
2. Request full stop landing
3. —Back—

To move the menu window:

1. Click the ATC window title bar and hold down the mouse button.
2. Drag the window to where you want it.
3. Release the mouse button.

To resize the ATC menu window:

- To change the width, point to the left or right window border. When the pointer changes to a horizontal double-headed arrow, drag the border to the right or left.

- To change the height, point to the top or bottom window border. When the pointer changes to a vertical double-headed arrow, drag the border up or down.

- To change the height and width simultaneously, point to any window corner. When the pointer changes to a diagonal double-headed arrow, drag the border in any direction.

ATC settings

You may want to customize settings for ATC, such as how much other traffic is in the area and which pilot voice you want to use.

To change ATC settings:

1. On the **Welcome** screen, click **Settings**, and then click **ATC**.
- Or-
1. On the **Options** menu, point to **Settings** and then select **ATC**.
2. Make changes in the **ATC Settings** dialog box.
3. Click **OK**.

USING ATC IN FLIGHT SIMULATOR 2002

To adjust the amount of air traffic:

Drag the **Air Traffic** slider to the right for more traffic.

Choosing a pilot voice

It's beyond the scope of this document to explain the process for creating custom voicepacks. This capability is part of Flight Simulator 2002, but it is not simple. The subject of creating custom voicepacks is covered in the Flight Simulator 2002 ATC SDK. You can, however, choose any of the voices that shipped with the product to use as your pilot voice. If the **Pilot Voice** check box is not selected, you can't choose a pilot voice and you won't hear a voice when you send a message to ATC.

To choose a pilot voice:

1. Select the **Pilot Voice** check box.
2. In the **Pilot Voice** list, select the voice you want to use as your pilot voice.
3. Click **OK**.

Turning off the pilot voice

There are three different kinds of voices you'll hear in Flight Simulator 2002: the pilot voice (which represents you), the ATC controller's voice, and the voices of other pilots talking on the same frequency. Some pilots prefer to hear only the ATC controller voice and not their pilot voice. You can turn off the pilot voice in Flight Simulator 2002 (you'll still hear the controller and the pilots in other aircraft).

To turn off the pilot voice:

1. Clear the **Pilot Voice** check box.
2. Click **OK**.

Generating IFR traffic only

Flight Simulator 2002 generates AI (artificially intelligent) aircraft that fly both VFR and IFR flight plans. If you're flying IFR and you don't want VFR aircraft flying at the same time, you can limit the type of AI traffic in the air.

To limit AI traffic to IFR only:

1. Select the **IFR traffic only** check box.
2. Click **OK**.

USING ATC IN FLIGHT SIMULATOR 2002

Turning off aircraft labels

Aircraft flying in your vicinity display a label showing the aircraft's callsign and the distance from your aircraft. The aircraft labels are displayed by default, but you can turn them off.

To turn off the aircraft labels:

1. Clear the **Aircraft labels** check box.
2. Click **OK**.

Turning on the ATC window auto-open feature

By default, the ATC window does not open automatically when messages are sent or when a response is required from the pilot. Some pilots prefer that the ATC window remain hidden until they want to open it manually; others want it to appear automatically.

To have the ATC window appear automatically

1. Select the **Auto-open ATC Window** check box.
2. Click **OK**.

Did you know you can turn down the engine sounds so it's more like you're really wearing a headset in the cockpit?

To adjust sounds:

1. On the Options menu, select **Settings**, and then click **Sounds**.
2. Drag the slider for the sound you want to change.

Turning off ATC

If you don't initiate contact with ATC at the beginning of your flight, you can fly without any interaction with controllers. You may still hear transmissions to other aircraft if your radio is tuned to a local frequency. Turn the avionics master switch off if you don't want to hear local radio calls.

USING ATC IN FLIGHT SIMULATOR 2002

Add-on ATC

If you're using an add-on air traffic control product, you can't turn off ATC. You can, however, choose not to interact with Flight Simulator's ATC, and ATC will, in effect, not be active. You can also reduce the volume of AI traffic generated in the simulator.

To adjust the amount of air traffic:

1. On the **Options** menu, select **Settings**, and then click **ATC**.
2. Drag the **Air Traffic** slider to **None** (far left).

Minimizing traffic

You can reduce the amount of air traffic sharing the radio frequencies and the sky.

To adjust the amount of air traffic:

1. On the **Options** menu, select **Settings**, and then click **ATC**.
2. Drag the **Air Traffic** slider to **None** (far left).

REAL-WORLD DIFFERENCES

To provide you with the best ATC system possible in Flight Simulator 2002, we included the features we felt would provide Flight Simulator pilots with a rich and compelling experience. The following list details aspects of Flight Simulator 2002 ATC that are either different or enhanced from real-world ATC.

The active runway

ATC in Flight Simulator 2002 recognizes only one active runway at any airport. The active runway is determined by weather conditions, and is always the longest runway at the airport that is aligned closest to the wind. When you communicate your intention to take off or land, your message automatically includes a request to the correct runway. Taxiing to the wrong runway means you will not get a clearance to take off. Landing on the wrong runway results in a message from the controller to clear the runway.

Airport choices

The ATC menu “Select landing airport” displays a list of the nearest airports within a 30 mile radius. Airports at the top of the list are closer than those farther down the list.

Filing IFR in the air

Because of the way IFR flight plan files are created in the Flight Planner, you can't file flight plans in the air. All flight plans place you on the ground at the departure airport selected in the flight plan. If you create a flight plan while in flight, a new flight begins at the departure airport selected in the Flight Planner.

IFR routes

All IFR flight plans in Flight Simulator 2002 are cleared along the route filed in the Flight Planner. All IFR clearances are issued “cleared as filed.” Detailed routes are not described in the clearance.

REAL-WORLD DIFFERENCES

DPs and STARs

Routes incorporating published DPs or STARs are not issued in clearances and cannot be requested in Flight Simulator 2002. You can still create these routes, however, by customizing waypoints in the Flight Planner file (files with a .pln extension are Flight Planner files). You will still hear ATC clear your flight “as filed” without including a DP or STAR. To learn more about customizing waypoints in routes, type **Creating Custom Waypoints** in the Help index.

Lost communications

Though it is possible to fail a radio in Flight Simulator 2002, ATC does not issue lost communication instructions. In addition, ATC will not know that you've lost communications. If they don't get a response from you, they will cancel your IFR flight plan. In that case, you won't be sequenced or cleared for landing.

Canceling IFR

When you cancel IFR, you'll be asked to confirm that you want to cancel IFR. This prevents inadvertent cancellation of an IFR flight. If you cancel IFR on the way to the runway, ATC will instruct you to taxi to the runway to request a VFR departure from the tower. If you cancel IFR above 18,000 ft, you will not be instructed to descend below 18,000 ft as you would be in the real world.

Cancellation of Flight Following

You can cancel Flight Following at any time. If you are on Flight Following or if you are on a transition through controlled airspace cancellation will occur when you choose to land. If you choose a landing airport from the ATC menu, the radio autotunes the airport frequency and any transition clearance or Flight Following is automatically cancelled without any further communication.

REAL-WORLD DIFFERENCES

Requesting changes in altitude

The best strategy for flying at the altitude you want is to select that altitude when you create the flight in the Flight Planner. You cannot request a different altitude from ATC while in flight.

Failure to respond

When flying IFR in Flight Simulator 2002, you must respond to controller's instructions. Failure to respond to instructions by ATC will result in cancellation of IFR flight plans.

Flight Service Station (FSS)

You can create IFR flight plans into and out of non-towered airports using the Flight Planner. If there is a Flight Service Station frequency at the departure airport, you'll receive your IFR clearance (including a clearance void time) on that frequency. Other FSS services, such as PIREPS, weather, and filing flight plans by radio, are not supported in Flight Simulator 2002.

Interacting with ATC

Unlike in the real world, you don't have to interact with ATC at all. You can fly through controlled airspace without ever calling a controller—and you won't be met by the authorities when you land on the ground.

VFR flight plans

The Flight Planner doesn't create VFR flight plans; it's a tool to plan your route. In Flight Simulator 2002, you do not need to cancel your flight plan when you arrive at your destination under VFR.

Mode C equipment

All aircraft in Flight Simulator 2002, except the Schweizer 2–32 sailplane and the Sopwith Camel, are Mode C transponder-equipped. That means that ATC always knows your altitude and reports the altitude of other aircraft. ATC in Flight Simulator 2002 responds to the Schweizer as though the sailplane has Mode C equipment, however, because ATC has radar coverage everywhere in the world and receives Mode C data on all aircraft. Likewise, ATC gives the altitude of the Sopwith when reporting it as traffic.

REAL-WORLD DIFFERENCES

Emergencies

In Flight Simulator 2002, you cannot declare an emergency.

Special VFR and VFR on top

Requests for Special VFR and VFR on top are not supported by ATC in Flight Simulator 2002.

Airspace differences

While great effort has been made to make the airspace volumes in Flight Simulator 2002 adhere to real-world boundaries, some airspace will differ. Airspace sectors and altitude steps may not be modeled exactly as they are in the real world. Some boundaries that do not exist in the real world had to be created in Flight Simulator 2002 for the purpose of broader ATC coverage. Flight Simulator 2002's ATC has perfect radar coverage everywhere in the world.

Airport differences

There is a tremendous amount of audio recorded for Flight Simulator 2002 ATC. Over 3,000 worldwide airport and controlling facilities, hundreds of aircraft types and airline names, and hundreds of basic phrases were recorded in 10 different voices. Non-towered airport names are not included. Non-towered airports are, however, identified by their ICAO identifier (that is, Crest Airpark is identified as "S36").

The airport and navaid data are based on the worldwide Jeppesen NavData database available at the time that Flight Simulator 2002 was developed. In some cases, that data differs from what you might see in the real world for various reasons. Given the long lead times necessary to create a product such as Flight Simulator 2002, some airport data may change in the real world by the time our product reaches the retail shelves.

REAL-WORLD DIFFERENCES

Three-digit frequencies

All three-digit radio frequencies are shortened to two digits (for example, 122.375=122.37).

Intersection departures

Flight Simulator 2002 includes runway intersection data. However, requests for intersection departures are not supported. You can still make an intersection departure, but there is no specific ATC phraseology to request intersection takeoffs.

ASOS and AWOS

Although there are separate frequencies for ASOS and AWOS, the two services are the same in Flight Simulator 2002 and are reported as AWOS. AWOS does not update continuously in Flight Simulator 2002. It updates when the weather changes or on the hour, whichever comes first.

Ocean operations

Extended flights across the oceans are no different from any other flights in Flight Simulator 2002. You can file IFR across the ocean, and you'll be handled by ATC during the entire flight. Unlike the real world, there are no areas without radar coverage.

ATC GLOSSARY

active runway

The runway to which you'll be cleared for takeoffs and landings by ATC. There is only one active runway at any airport in Flight Simulator 2002. It's the longest runway that is most closely aligned with the wind.

advisory (frequency)

In Flight Simulator 2002, this is similar to CTAF. Pilots use the advisory frequency at non-towered airports to let other air traffic know they are on approach or taking off.

Airport / Facility Directory

U.S. government publication that provides information about airports and navigation facilities. Use the A / FD to get information about radio frequencies, runways, instrument approaches, layout of airports, and other details. A / FDs can be purchased at most pilot supply stores.

airspace

Refers to designated volumes of space that determine whether and by which controlling agency a particular area is controlled.

altimeter setting

The local barometric pressure reading dialed into the Kollsman window of an altimeter. The setting can be obtained from the automated weather services in Flight Simulator 2002, and is read to the pilot by ATC in some instances.

approach control

An air traffic controller that directs aircraft in and out of congested areas. Approach usually handles traffic between the tower-controlled and center-controlled phase of flight. Approach controllers frequently handle departing as well as arriving flights.

ARTCC

The Air Route Traffic Control Centers direct aircraft between the phases of IFR flight controlled by departure and arrival controllers. They may also handle VFR traffic on Flight Following.

ASOS (Automated Surface Observation System)

A continuously updated (minute-by-minute) automated weather briefing system used at some U.S. airports. For more on ASOS, see **Getting Airport Information** on page 19.

ATC GLOSSARY

ATC name

Refers to the name by which an aircraft is identified by ATC in Flight Simulator 2002 in the aircraft callsign. ATC name corresponds to the `atc_type` entry in the `Aircraft.cfg` file for each aircraft.

Example:

```
atc_type=Cessna  
atc_id_enable=1  
atc_id=N700MS
```

ATIS (Automated Terminal Information System)

A recorded airport weather briefing updated hourly (or when there are significant weather changes). For more on ATIS, see **Getting Airport Information** on page 19.

Autotune

Autotune is a feature of ATC in Flight Simulator 2002 that automatically switches radio frequencies on the communication radio and transponder. Switching occurs when you select an item from the ATC menu that contacts a new air traffic controller.

AWOS (Automated Weather Observation System)

A continuously updated (minute-by-minute), automated airport weather briefing system used at some U.S. airports. For more on AWOS, see **Getting Airport Information** on page 19.

base

In airport traffic patterns, a pattern leg at right angles to the landing runway. Base leg connects the downwind leg to the extended runway centerline.

callsign

The identification that ATC and a pilot use for a particular flight or aircraft. Callsigns are generally a combination of the aircraft type or manufacturer and the aircraft registration for civilian planes, a combination of the airline and flight number for airline flights, and a combination of branch of service and flight number for military flights. Callsigns should always be included in any communication with ATC to avoid confusion about who's talking.

ATC GLOSSARY

clearance delivery

Clearance delivery issues IFR clearances. A clearance is necessary before departing on an instrument flight plan.

closed traffic (touch and go)

A landing during which the pilot doesn't let the aircraft come to a complete stop before applying power and taking off again. This is often done to practice takeoffs and landings.

crosswind

In traffic patterns, a pattern leg at right angles to the landing runway off the departure end.

departure control

Departure control directs aircraft out of congested traffic areas. Departure usually handles traffic between the tower-controlled and center-controlled phase of flight. Departure controllers frequently handle arriving as well as departing flights.

downwind

The direction the wind is blowing. In airport traffic patterns, downwind refers to the pattern leg flown parallel to the runway in the direction the wind is blowing (opposite to the direction of landing).

DPs (departure procedures)

DPs are published procedures for departing a particular airport on an instrument flight plan. ATC in Flight Simulator 2002 does not include DPs in IFR clearances.

final

In airport traffic patterns, the pattern leg directly along the extended runway centerline.

Flight Following

A radar service for VFR aircraft that provides traffic advisories when the controller isn't too busy. It's a useful service when pilots are flying cross-country and may have to transition through multiple controllers' airspaces, as they don't have to request a transition from each controller along the way and can get traffic advisories.

flight plan

In Flight Simulator 2002, flight plans refer to IFR flights. You can create a flight plan in the Flight Planner, and ATC will clear you along that route. VFR routes can be planned using the Flight Planner, but ATC does not use the routing information in VFR plans for any communication during the flight.

ATC GLOSSARY

flight level

In the U.S., pilots flying above 18,000 ft (5,486 m) are required to set the digits in the altimeter's Kollsman window to 29.92. The resulting altimeter reading is called a flight level. When the Kollsman window is set to 29.92 (1013.2 mb) and the altimeter reads 30,000 ft, the altitude is stated as, "Flight Level 300 (three zero zero)."

Flight Planner

The Flight Planner is used to create IFR flight plans and for planning routes for VFR flights. You can access the entire airport database in Flight Simulator 2002 through the Flight Planner. To learn more about using this feature, type **Flight Planner** in the Help index.

FSS (Flight Service Station)

Air traffic facilities that provide a variety of services to pilots. In Flight Simulator 2002, remote IFR clearances at airports without clearance delivery are given on FSS frequencies.

full stop landing

A landing that includes a complete stop on the runway, or when the aircraft leaves the runway on the ground before taxiing back for another takeoff.

ground control

Ground control directs aircraft traffic between parking and the runway.

hold short

When a ground or tower controller wants an aircraft to stop at a certain location while taxiing, the controller will tell the pilot to "hold short." This is usually in reference to a runway. The entire instruction is, "Hold short of runway X," where X is the runway number.

IFR (Instrument Flight Rules)

Rules governing flights conducted under instrument meteorological conditions (flights conducted below VFR minimums).

ATC GLOSSARY

IFR clearances

An IFR clearance is issued by clearance delivery prior to departure. The clearance includes information about the route of flight, altitude to be flown, and the radio frequency for the departure controller.

ILS (instrument landing system)

A precision approach system that includes a glideslope, localizer, marker beacons, and airport lighting.

instrument rated

Pilots who have received the required IFR training and have passed both written and practical exams are awarded an instrument rating. They can then fly in weather conditions during which they fly by reference to the cockpit instruments.

missed approach

Declaration by a pilot on an instrument approach that he has reached the point designated as a missed approach point without seeing the runway or airport lighting. Declaring a missed approach also signals the pilot's intent to execute the published missed approach procedure.

Mode C transponder

A transponder is a transmitter / receiver that returns a signal when interrogated by a signal from the ground. When a pilot dials a particular code into the transponder, that code shows up on controllers' radar screens next to the aircraft's radar image. Mode C provides the aircraft's altitude to the controller as well.

parking gate

In Flight Simulator 2002, parking gates are attached to airport terminal buildings.

parking spot

In Flight Simulator 2002, parking spots are usually in open areas on the airport.

progressive taxi

Progressive directions from a ground controller to a pilot to assist the pilot in navigating between parking and the runway.

pushback

The act of being pushed back from an airport terminal gate. This is usually done by hooking a small tug to the nose wheel of a large aircraft and pushing it backwards into the taxi lane. In Flight Simulator 2002, press **SHIFT+P** to push back from the gate.

ATC GLOSSARY

radar contact

Acquisition of the radar image of a particular aircraft by the controller. A controller issues a transponder code to a pilot, and the pilot sets the code into the transponder. When the controller sees the image of that aircraft on the radar screen, she advises the pilot she has radar contact.

squawk

Terminology used by air traffic controllers to request a pilot to set a specific code into the transponder radio.

STARs (standard terminal arrival routes)

Published procedures for particular airports to get a flight from the en route to the approach phase of flight. ATC in Flight Simulator 2002 does not include STARs in IFR approach clearances.

taxiway

Avenues by which aircraft get to and from the runway at airports. By using a taxiway, the aircraft avoids conflicts with aircraft on the runway.

terminal

The building through which arriving and departing passengers pass when getting onto or off of aircraft at an airport. Parking gates in Flight Simulator 2002 are attached to terminals.

touch and go (closed traffic)

A landing during which the pilot doesn't let the aircraft come to a complete stop before applying power and taking off again. This is often done to practice takeoffs and landings.

tower control

The controllers in the tall towers at airports direct the air traffic within the airport traffic area. Takeoffs and landings are done under their control as well as transitions through their airspace.

transition

In aviation terms, a transition refers to crossing through controlled airspace. In Flight Simulator 2002, you can request clearance from ATC to transition through controlled airspace. The ATC menu includes requests for transitions when you are heading toward airspace for which a transition is appropriate.

ATC GLOSSARY

transponder

A cockpit receiver / transmitter that receives signals from ground-based radar and transmits a specific code back to the ground-based equipment. This allows air traffic controllers to identify specific aircraft moving across their radar screens.

upwind

In airport traffic patterns, a pattern leg parallel to the landing runway in the direction opposite the wind.

vectors

Directions given by a controller to pilots to position them for an approach or to avoid other aircraft. The directions include the direction in which pilots should turn (left or right) and the new compass heading they should fly.

“Cessna 0MS, turn right heading 270.”

VFR (Visual Flight Rules)

Following are the Federal Aviation Regulations regarding VFR minimums (U.S. government publication).

FAR 91.155 - Basic VFR weather minimums.

(a) Except as provided in paragraph (b) of this section and Sec. 91.157, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace in the following table:

Air space	Flight visibility	Distance from clouds
Class A	Not applicable	Not applicable
Class B	3 statute miles	Clear of clouds
Class C	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E At or above 10,000 feet MSL	5 statute miles	1,000 feet below 1,000 feet above 1 statute mile horizontal

ATC GLOSSARY

VHF radio

Very high frequency radio range used for aircraft communication and navigation.

visibility

The ability to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported by weather services as statute miles, hundreds of feet, or meters.

visual approach

An IFR approach that authorizes the pilot to continue visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or the preceding aircraft in sight. The approach must be authorized by and under the control of the appropriate air traffic control facility. Weather at the airport must include a reported ceiling at or above 1,000 feet and visibility of three miles or greater.

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